

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 411 578 A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 90114702.5

(51) Int. Cl.⁵: **A61M 35/00**

(22) Date of filing: 31.07.90

(30) Priority: 01.08.89 JP 199591/89
01.08.89 JP 199592/89

(43) Date of publication of application:
06.02.91 Bulletin 91/06

(84) Designated Contracting States:
BE DE FR GB IT NL SE

(71) Applicant: **TERUMO KABUSHIKI KAISHA**
No. 44-1, Hatagaya 2-chome, Shibuya-ku
Tokyo 151(JP)

(72) Inventor: **Honda, Shinzo**
c/o Terumo Kabushiki Kaisha, 44-1 Hatagaya
2-chome
Shibuya-ku, Tokyo(JP)

Inventor: **Hirose, Kazunori**
c/o Terumo Kabushiki Kaisha, 1727-1,
Tsuijjarai
Showa-cho, Nakakoma-gun,
Yamanashi-ken(JP)

Inventor: **Kanda, Zensho**
c/o Terumo Kabushiki Kaisha, 1727-1,
Tsuijjarai
Showa-cho, Nakakoma-gun,
Yamanashi-ken(JP)

(74) Representative: **Henkel, Feiler, Hänzeler & Partner**
Möhlstrasse 37
D-8000 München 80(DE)

(54) **Liquid applicator.**

(57) A liquid applicator includes a case (5) for containing a liquid (6) and an applying member (8), housed in the case (5), for applying the liquid (6). The case (5) is broken to expose the applying member (8), thereby allowing application of the liquid (6) via the applying member (8). The shape of the distal end face (7) of the applying member (8) is formed to

be substantially rhombic or elliptic so that the thickness in one direction is larger than the thickness in another direction perpendicular to the one direction. By moving the distal end face (7) of the applying member (8) in the another direction perpendicular to the one direction, the liquid (6) can be applied on a wide affected part within a short time period.

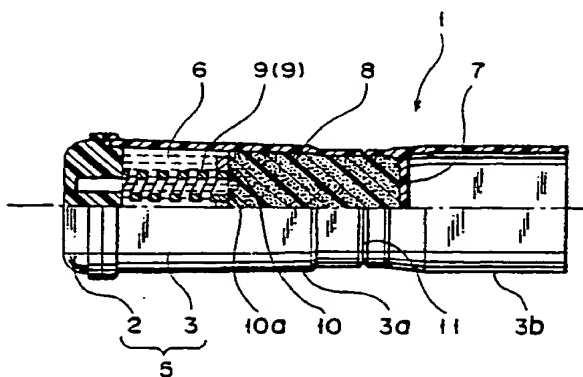


FIG. 8

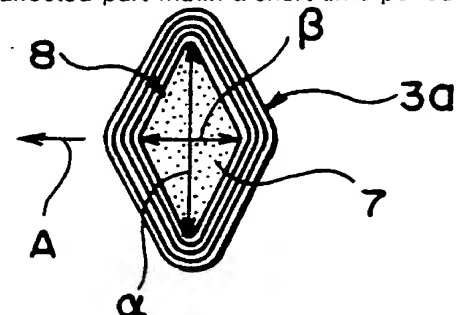


FIG. 10

BEST AVAILABLE COPY

EP 0 411 578 A1

LIQUID APPLICATOR

The present invention relates to a liquid applicator having a case for containing a liquid such as a disinfectant solution and an applying member, housed in the case, for applying the liquid, which can be carried out in the fields or kept in a house for a sudden need and can apply the liquid such as a disinfectant solution on an affected part by opening the case.

Generally, as a disinfecting/curing means for use in the case of an emergency such as an external wound or the sting of an insect or for use in a house, a liquid such as a disinfectant solution contained in a medicine bottle is impregnated in an applying member such as absorbent cotton, and the applying member is used to clean an affected part or apply the solution on the affected part.

Examples of a conventional simple liquid applicator which can eliminate such a cumbersome handling are an applicator having an applying member with liquid permeable properties at an opening of a case of a liquid such as a disinfectant solution, for directly applying the liquid on an affected part by using the applying member, an applicator having a mechanism for spraying a liquid, and an applicator which seals a napkin-like applying member consisting of a non-woven fabric and containing a liquid.

In recent years, a liquid applicator 50 as shown in Fig. 1 is proposed as a sanitary liquid applicator which can be easily handled by combining advantages of the above conventional applicators (Published Unexamined Japanese Patent Application No. 63-181776). This liquid applicator 50 seals a liquid 54 such as a disinfectant solution in an amount which can be consumed at once in a case 52. The case 52 is constituted by a plunger portion 56 and a case main body 58 which are connected at an opening end 62 of the case main body 58. The case main body 58 is constituted by a large-diameter portion 58a and a small-diameter portion 58b continuous each other. An opening means 64 is formed in the small-diameter portion 58b (Fig. 1). In order to use this liquid applicator 50, the opening means 64 of the case 52 is opened (Fig. 2), and the liquid 54 such as a disinfectant solution is directly applied on an affected part by an exposed columnar applying member 66 (Fig. 3).

In addition, a liquid applicator 70 as shown in Fig. 4 is provided by the present assignee (Japanese Patent Application No. 01-30572). This liquid applicator 70 is formed to be substantially the same as the liquid applicator 50 shown in Fig. 1 except that a columnar applying member 86 is elongated. A case 72 is constituted by a plunger portion 76 and a case main body 78 which are

connected at an opening end 82 and seals a liquid such as a disinfectant solution.

A reinforcing core member 92 is inserted in the applying member 86 to support the elongated applying member 86. The reinforcing core member 92 has elasticity which allows the member 92 to be bent when the case 72 is opened and has rigidity which allows the member 92 to support the applying member 86 when a side applying portion 94 of the applying member 86 is used to apply the liquid on an affected part.

In order to use the liquid applicator 70, an opening means 84 of the case 72 is opened (Fig. 5), and the liquid is applied by the applying portion 94 of the exposed applying member 86 on an affected part (Fig. 6). Therefore, the liquid can be applied on a wide area of the affected part by one application action.

In the above liquid applicator 50, however, the columnar applying member 66 is obtained by binding a large number of long acetylcellulose-based fibers to form a columnar member as a whole or by using a porous material such as sponge. Therefore, since the columnar applying member 66 has no satisfactory rigidity, it is difficult to elongate its exposed portion. As a result, since the distal end face of the applying member is mainly used as an applying portion, it takes a long time to apply the liquid on a wide affected part, as shown in Fig. 3. Although the diameter of the columnar applying member 66 can be increased to apply the liquid on a wide affected part within a short time period, the entire applicator size is increased upon increasing the diameter of the case 58. Therefore, the applicator cannot be conveniently kept in a house or carried out in the fields.

The liquid applicator 70 according to the present assignee can apply a liquid on a wide area of an affected part by one application action. However, the structure of this applicator is comparatively complicated, or its entire length is increased since the applying member 86 is elongated.

The present invention, therefore, has been made in consideration of the above situation and has as its object to provide a liquid applicator which has a simple structure and a length substantially the same as that of a conventional applicator and can apply a liquid on a wide affected part within a short time period without causing adhesion of the liquid on fingers after it is opened.

In order to achieve the above object, a liquid applicator of the present invention comprises a case for containing a liquid, and an applying member, housed in the case, for applying the liquid, the case exposing the applying member when broken,

thereby allowing application of the liquid, wherein a shape of the distal end face of the applying member is formed such that the thickness in one direction is larger than the thickness in another direction perpendicular to the one direction.

In a preferred aspect, a ratio of the thickness in the one direction to the thickness in the another direction perpendicular to the one direction is about 3 to 1.2. The shape of the distal end face is, e.g., substantially a rhombus or ellipse. The cross section of the opening means formed in the broken portion of the case may be an ellipse substantially the same as the shape of the distal end face of the applying member.

According to the liquid applicator having the above arrangement, at least the shape of the distal end face of the applying member for applying a liquid on an affected part is formed such that the thickness in the one direction of the distal end face is larger than that in the another direction perpendicular to the one direction. Therefore, when a portion of the case is broken to open the case and expose the applying member, a liquid can be applied on a wide affected part within a short time period by moving the distal end face of the applying member in a direction perpendicular to the direction of the larger thickness. That is, although the liquid applicator of the present invention has a simple structure and the entire axial length substantially the same as that of a conventional applicator, it can apply a liquid on a wide affected part within a short time period without causing adhesion of the liquid on fingers after it is opened.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a partially cutaway longitudinal sectional view showing a conventional liquid applicator;

Fig. 2 is a partially cutaway longitudinal sectional view showing a state in which the applicator shown in Fig. 1 is opened;

Fig. 3 is a perspective view for explaining an application state of the applicator shown in Fig. 1;

Fig. 4 is a partially cutaway longitudinal sectional view showing another conventional liquid applicator;

Fig. 5 is a partially cutaway longitudinal sectional view showing a state in which the applicator shown in Fig. 4 is opened;

Fig. 6 is a perspective view for explaining an application state of the applicator shown in Fig. 4;

Fig. 7 is a perspective view showing a liquid applicator according to the first embodiment of the present invention;

Fig. 8 is a partially cutaway longitudinal sectional view showing the liquid applicator shown in Fig. 7;

Fig. 9 is a partially cutaway longitudinal sectional view showing a state in which a case main body of the liquid applicator is opened;

Fig. 10 is a side view taken along a line X - X in Fig. 9;

Fig. 11 is a partially cutaway sectional view showing a state in which a straight cylindrical portion of the case main body of the applicator shown in Fig. 7 is used as a cap;

Fig. 12 is a perspective view for explaining an opening state of the liquid applicator shown in Fig. 7;

Fig. 13 is a perspective view for explaining an application state of the applicator shown in Fig. 7;

Fig. 14 is a partially cutaway longitudinal sectional view showing a liquid applicator according to the second embodiment of the present invention; and

Figs. 15 to 17 are side views taken along lines XV - XV, XVI - XVI, and XVII - XVII shown in Fig. 14, respectively.

A liquid applicator 1 comprises a case 5 constituted by a cap portion 2 consisting essentially of a hard plastic material and having a substantially rhombic section and a case main body 3 consisting essentially of a hard plastic material and having a substantially rhombic section. The cap portion 2 and the case main body 3 are connected at an opening end 4 of the case main body 3. A substantially rhombic applying member (to be simply referred to as an applying member hereinafter) 8 for applying a liquid 6 such as a disinfectant solution contained in the case 5 is housed in the case 5. Urging springs 9 are fixed to the cap portion 2, and a rhombic plate 10 is fixed to the distal ends of the springs 9. A hole 10a is formed in the plate 10. The case main body 3 is constituted by a tapered cylindrical portion 3a having an inclined wall surface and a straight cylindrical portion 3b. An opening means 11 having a thin circumferential wall is formed at a portion of the case main body 3.

The liquid 6 such as a disinfectant solution is sealed in a hollow portion of the tapered cylindrical portion 3a as shown in Fig. 8. The applying member 8 is housed in the hollow portion of the tapered cylindrical portion 3a of the case main body 3 molded into a rhombic shape as shown in Fig. 8. That is, the circumferential surface of the applying member 8 is held by the inclined wall surface of the tapered cylindrical portion 3a, and its proximal end portion is supported by the rhombic plate 10.

Since the hole 10a for passing the liquid 6 is formed in the rhombic plate 10, the liquid 6 is smoothly supplied to the applying member 8. In

addition, since the application pressure of the applying member 8 can be kept at a predetermined pressure by the urging springs 9 upon application of the liquid 6 on an affected part, the liquid 6 is not excessively applied on the affected part. Furthermore, since the applying member 8 has a substantially rhombic shape, a thickness in one direction, e.g., α shown in Fig. 10 is larger than a thickness in a direction perpendicular to the first direction, e.g., β shown in Fig. 10. Therefore, when the applying member 8 is moved in a direction indicated by an arrow A in Fig. 10, the liquid 6 can be applied on a wide area of an affected part by one application action. A ratio of α to β (α/β) is preferably 3 to 1.2. If the ratio exceeds 3, the opening means 11 cannot be easily opened. If the ratio does not reach 1.2, an application area is undesirably decreased.

The cap portion 2 and the case main body 3 consist essentially of a hard plastic material which is inactive, i.e., does not dissolve, is not denatured and does not swell, and less permeable with respect to the liquid 6. The cap portion 2 and the case main body 3 preferably consist essentially of the same type of hard plastic material in order to perform ultrasonic fusing. Therefore, a homopolymer of polypropylene is preferably used as the hard plastic material to mold each part by injection molding, extrusion molding, blow molding, injection-blow molding, or vacuum molding. Note that the case main body 3 and the cap portion 2 must be strongly connected to form the case 5 while the liquid 6 is contained in the hollow portion of the tapered cylindrical portion 3a. When the same type of hard plastic material is used, ultrasonic fusing can be performed to strongly connect these parts.

The opening means 11 is formed in the straight cylindrical portion 3b located at a side opposite to the cap portion 2 from substantially the middle point in the entire longitudinal direction of the case main body 3 of the case 5. This thickness of the circumferential wall of this opening means 11 is decreased to be 0.05 to 0.5 mm, and preferably, 0.1 to 0.2 mm. The opening means 11 is, e.g., a V-shaped groove as shown in Fig. 11, and the radius of curvature of the groove bottom is minimized. It is important to form the opening means 11 such that the opening means 11 does not easily receive a force in a normal state but can be easily broken upon concentration of a stress on the groove bottom only when a force in a breaking direction is applied sideward on the case main body 3.

In order to open the case 5, a user holds both sides of the opening means 11 with both hands, puts the thumbs of both hands at both sides of the opening means 11, and applies a force in the bending direction on the case main body 3, there-

by breaking the opening means 11. As a result, the case main body 3 of the case is separated into the tapered cylindrical portion 3a and the straight cylindrical portion 3b, and the applying member 8 is exposed from the distal end of the tapered cylindrical portion 3a as shown in Fig. 9. That is, the applying member 8 is located at the tapered cylindrical portion 3a side, and its distal end face 7 is exposed by about 3 to 5 mm from the opening means 11. Therefore, when the substantially rhombic distal end face of the applying member 8 is moved in the direction indicated by an arrow A shown in Fig. 10, the liquid 6 can be easily applied or dropped to clean a wide affected part within a short time period.

The applying member 8 preferably consists essentially of a material which has excellent permeability to the liquid 6, is inactive with respect to the liquid 6, has an excellent form retention property, provides a good feeling when the liquid is applied on a skin, and hardly produces pieces of the applying member. Examples of the material of the applying member 8 are a material obtained by binding a large number of long acetylcellulose-based fibers to form an elliptic column as a whole and a porous material.

In the tapered cylindrical portion 3a released from a sealed state upon opening of the opening means 11, when a force in a direction indicated by an arrow B shown in Fig. 9 is applied on the applying member 8 of the liquid applicator 1, i.e., when the applying member 8 is set in an application state, it is compressed between an object to be applied (e.g., the back of hand) and the rhombic plate 10. A liquid portion passing through the hole 10a of the plate 10 soaks in the applying member 8 by a capillary action. Therefore, when the applying member 8 is compressed, the liquid 6 leaks from the distal end face 7 of the applying member 8 and is applied or dropped to clean a necessary portion.

The liquid applicator 1 of the present invention is assembled as follows. That is, the applying member 8 is inserted from the opening end 4 side into the case main body 3, the liquid 6 is contained therein, and the cap portion 2 is connected at a flange portion of the opening end 4 by ultrasonic fusing, in which the cap has the urging springs 9 with the rhombic plate 10 fixed to their distal ends.

An operation of the liquid applicator 1 having the above arrangement will be described below. Since the cap portion 2 and the case main body 3 of the liquid applicator 1 consist essentially of a hard plastic material, the cap portion 2 and the case main body 3 serve as holding portions of the applying member 8 when the applicator 1 is used. In addition, since the cap portion 2 and the case main body 3 are hard, the urging springs 9 of the

cap portion 2 mounted on the opening end 4 of the case main body 3 serve to positively push the liquid 6 contained in the case main body 3. That is, as shown in Fig. 9, in an initial stage of use, the liquid 6 contained in the tapered cylindrical portion 3a of the case main body 3 can be urged by urging the applying member 8 in the direction indicated by the arrow B in Fig. 9 and supplied to outside via the applying member 8 exposed from one side of the case main body 3.

The opening means 11 serves to open the case 5. That is, a user holds the cap portion 2 and the tapered and straight cylindrical portions 3a and 3b of the case main body 3 of the case 5 with both hands, and puts fingers of both hands on both sides of the opening means 11. Thereafter, the user applies a force on the fingers to bend the case main body 3 at the position of the opening means 11 to tear off the thin circumferential wall of the opening means 11 from its one side, thereby separating the straight cylindrical portion 3b from the tapered cylindrical portion 3a (Fig. 12).

A portion of the applying member 8 is exposed at the tapered cylindrical portion 3a side from the straight cylindrical portion 3b removed upon opening of the case 5. As shown in Fig. 13, the substantially rhombic distal end face 7 of the applying member 8 has a shape suitable for applying a liquid on a wide affected part. That is, when the exposed substantially rhombic distal end face 7 of the applying member 8 is moved in the direction indicated by the arrow A in Fig. 13, a liquid can be applied on a wide affected part by the distal end face 7 of the applying member 8. In addition, when the distal end face 7 of the applying member 8 is moved in a direction indicated by an arrow E shown in Fig. 13, the distal end face can serve as a tip portion of a brush. Therefore, the applying member 8 can also apply a liquid on a narrow affected part. Since the liquid 6 is sealed in the tapered cylindrical portion 3a housing the applying member 8, the applying member 8 is wet with the liquid 6 in this state. Therefore, a desired portion can be applied or cleaned with the liquid 6.

Since the distal end portion of the straight cylindrical portion 3b to be separated upon opening is hollow (Figs. 8 and 9), this distal end portion of the straight cylindrical portion 3b can be used as a cap to be fitted on the tapered cylindrical portion 3a. Therefore, the liquid applicator can be used a plurality of times (Fig. 11).

Fig. 14 is a partially cutaway longitudinal sectional view showing a liquid applicator according to the second embodiment of the present invention corresponding to Fig. 8 of the first embodiment. Figs. 15 to 17 are side views taken along lines XV - XV, XVI - XVI, and XVII - XVII in Fig. 14. The second embodiment basically has the same struc-

ture as that of the first embodiment except for a difference to be described below. Therefore, the same reference numerals as in the first embodiment denote the same parts and a detailed description thereof will be omitted.

In the second embodiment, the cross sectional shape of each of an applying member 8 and an opening means 11 is not rhombic but substantially elliptic. This embodiment has been made in consideration of ease in opening of a case main body 3.

As shown in Fig. 15, the applying member 8 is an elliptic column, and its cross sectional shape (the same as the shape of a distal end face 7) is formed such that a thickness $\alpha 1$ in one direction of the applying member 8 is larger than a thickness $\beta 1$ in a direction perpendicular to the first direction. Therefore, also in the second embodiment, when the applying member 8 is moved in a direction indicated by an arrow A shown in Fig. 13, a liquid 6 can be applied on a wide area of an affected part by one application action.

As shown in Fig. 16, the shape of the opening means 11 is substantially elliptic. In terms of moldability of the case main body 3, the cross sectional shapes of portions 15 and 17 of the case main body 3 near the two sides of the opening means 11 are formed to be substantially elliptic as shown in Figs. 15 and 17, respectively. An outer appearance of the other portion of the case main body 3 is substantially rhombic as in the first embodiment. As in the first embodiment, the thickness of the circumferential wall of a straight cylindrical portion 3b of the opening means 11 is as small as 0.05 to 0.5 mm, and preferably, 0.1 to 0.2 mm.

In the elliptic shape of the opening means 11, a ratio ($\alpha 0/\beta 0$) of a major axis $\alpha 0$ to a minor axis $\beta 0$ shown in Fig. 16 is preferably 3 to 1.2. If the ratio exceeds 3, the opening means 11 cannot be easily broken. If the ratio does not reach 1.2, although the opening means 11 can be easily broken, it is difficult to selectively use a surface for applying on a wide area and that for applying on a narrow area in the applying member 8 having a shape corresponding to that of the opening means 11. Note that the substantially elliptic shape includes an egg-like shape.

Since the sectional shape of the opening means 11 is substantially elliptic, no straight portion is present in the cross section unlike in a rhombus, i.e., the entire section is a curve. Therefore, when the opening means 11 is to be broken by an external force, a portion of the opening means 11 at which the external force is concentrated cracks, and the external force is constantly concentrated at the breaking portion. Therefore, breaking rapidly progresses to finally, completely

open the opening means 11. If the sectional shape of the opening means 11 is rhombic, however, an external force is applied on straight portions in the cross section. Therefore, since the external force is dispersed by the straight portions, it is difficult to concentrate the force at one point. Even when the opening means 11 is broken and cracks, since the external force is not easily concentrated at the breaking portion, breaking does not easily progress. Therefore, nonseparated portions of the opening means 11 easily remain to make it difficult to open the opening means 11.

In order to use the distal end portion of the straight cylindrical portion 3b to be separated upon opening as a cap to be fitted on a tapered cylindrical portion 3a, a hollow portion inside the distal end of the straight cylindrical portion 3b is formed to be elliptic similar to the portion 15 of the case. Therefore, since the distal end portion of the straight cylindrical portion 3b can be used as a cap in the same manner as that shown in Fig. 11 of the first embodiment, the liquid applicator of the second embodiment can be used a plurality of times.

The operation and the assembly method of the second embodiment except for those described above are exactly the same as those of the first embodiment.

The elliptic cross sectional shape of the opening means 11 can be adopted even when the shape of the distal end face 7 of the applying member 8 is not elliptic but another shape, e.g., rhombic or rectangular. Note that even if the distal end shape is not elliptic, the applying member 8 preferably has an elliptic shape substantially the same as that of the opening means 11 at a position adjacent to the opening means 11. In this case, therefore, another shape of the distal end face of the applying member 8, e.g., a rhombus is gradually changed into an ellipse toward the opening means 11.

Although a disinfectant solution is contained as the liquid 6 in the above two embodiments, the present invention is not limited to the above embodiments. For example, a toilet lotion or cleaning solution used in daily living can be arbitrarily contained as the liquid 6 in the case 5 of the liquid applicator 1.

Claims

1. A liquid applicator comprising:
a case (5) for containing a liquid (6); and
an applying member (8), housed in said case (5),
for applying the liquid (6), said case (5) exposing
said applying member (8) when broken, thereby
allowing application of the liquid (6),
characterized in that a shape of the distal end face

(7) of said applying member (8) is formed such that a thickness in one direction is larger than a thickness in another direction perpendicular to the one direction.

2. An applicator according to claim 1, characterized in that a ratio of the thickness in the one direction to the thickness in the another direction perpendicular to the one direction in the distal end face (7) of said applying member (8) is about 3 to 1.2.

3. An applicator according to claim 2, characterized in that a shape of the distal end face (7) of said applying member (8) is substantially a rhombus.

4. An applicator according to claim 2, characterized in that a shape of the distal end face (7) of said applying member (8) is substantially an ellipse.

5. An applicator according to claim 1, characterized in that opening means (11) having a thickness smaller than the thickness of said case (5) is formed at a portion to be broken of said case (5), a cross section of said case (5) at a formation position of said opening means (11) being formed to be substantially an ellipse.

6. An applicator according to claim 5, characterized in that a cross sectional shape of said applying member (8) at the opening means formation position is formed to be substantially the same ellipse as that of said case (5).

7. An applicator according to claim 6, characterized in that said applying member (8) is an elliptic column, the shape of the distal end face (7) of said applying member (8) being substantially the same as that of the cross section thereof at the opening means formation position.

8. An applicator according to claim 7, characterized in that a ratio of the major axis to the minor axis of the ellipse of the opening means (11) is about 3 to 1.2.

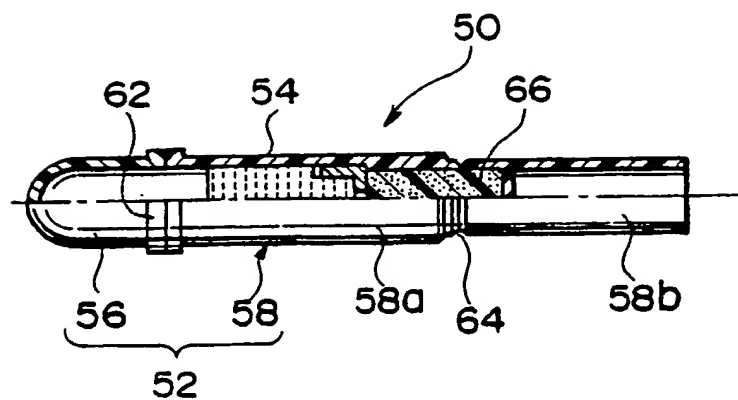


FIG. 1

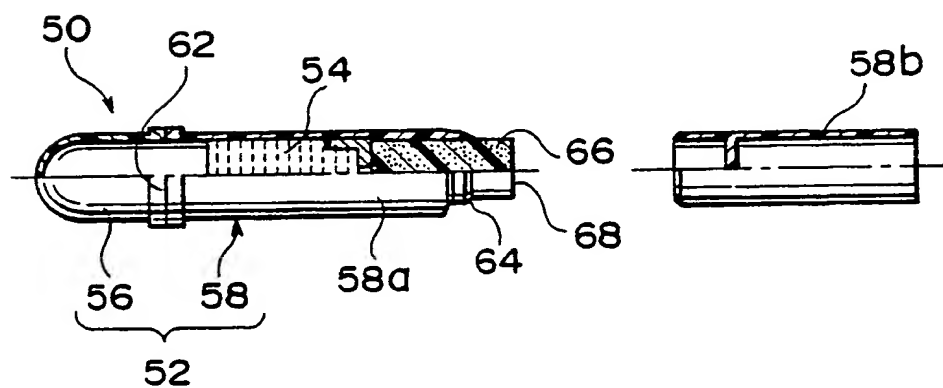


FIG. 2

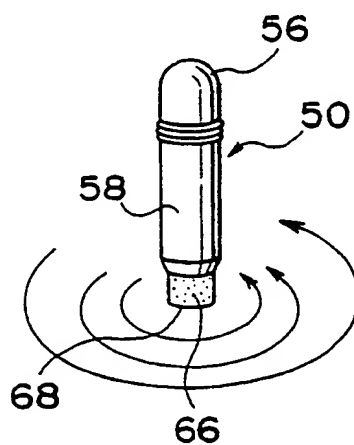


FIG. 3

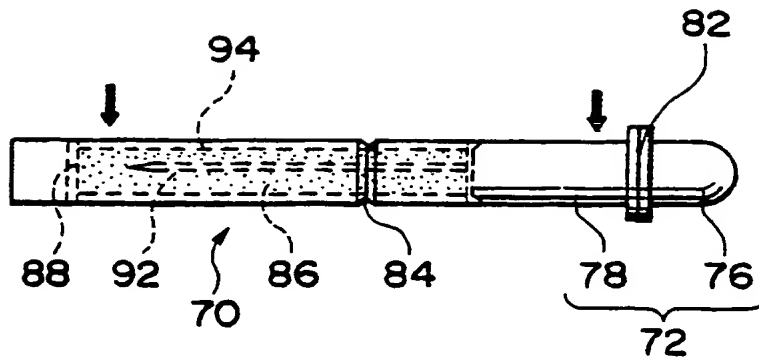


FIG. 4

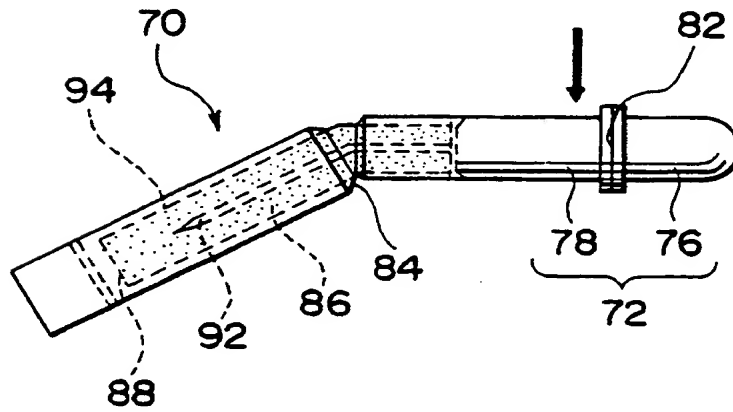


FIG. 5

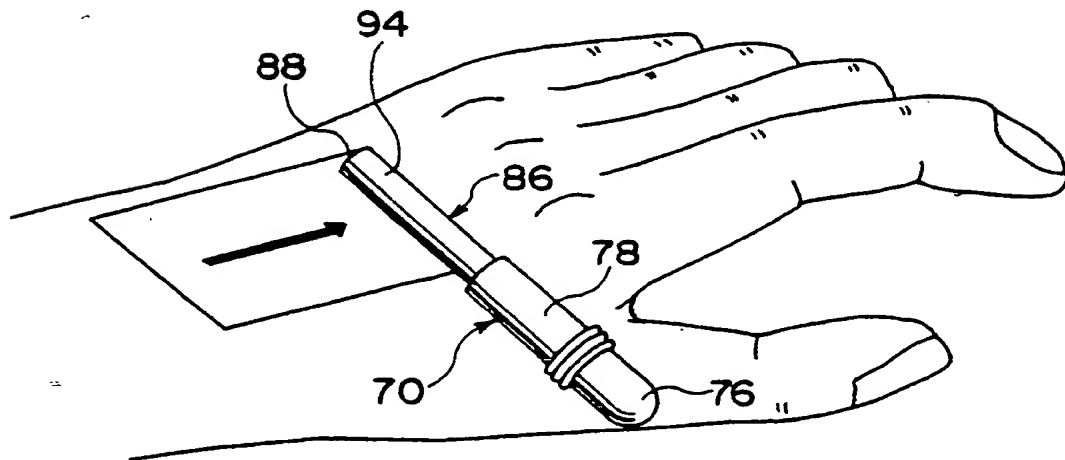


FIG. 6

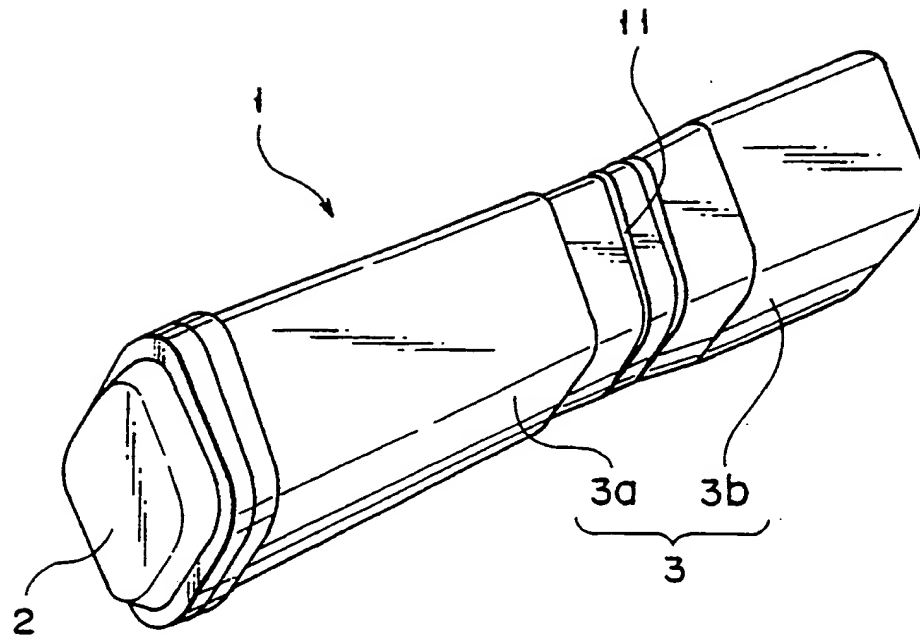


FIG. 7

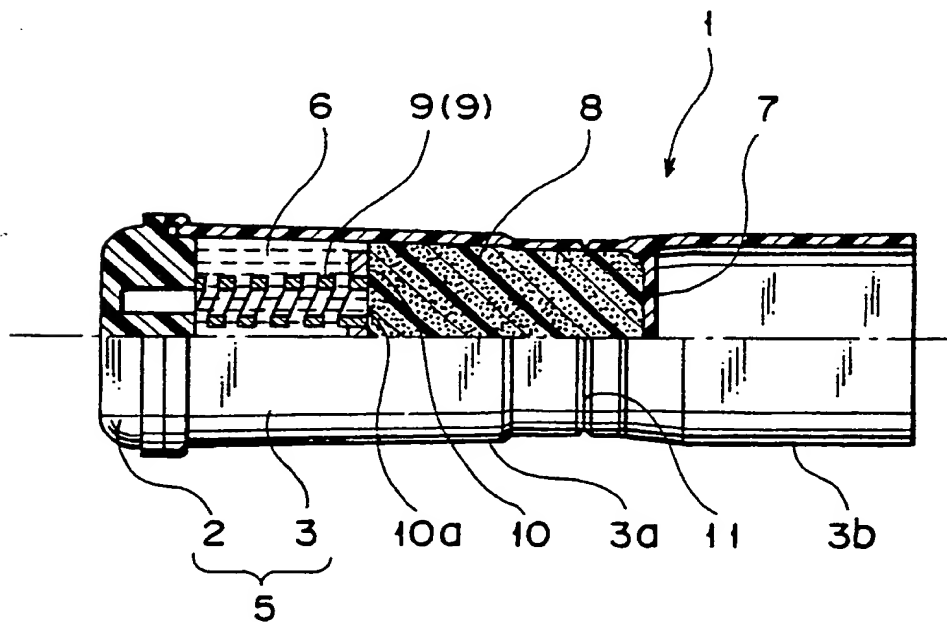


FIG. 8

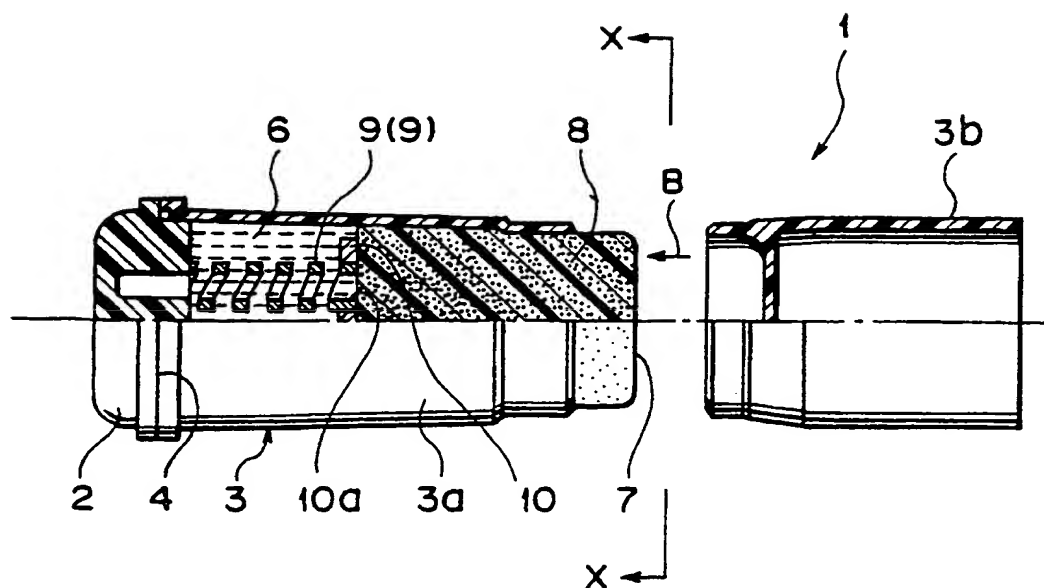


FIG. 9

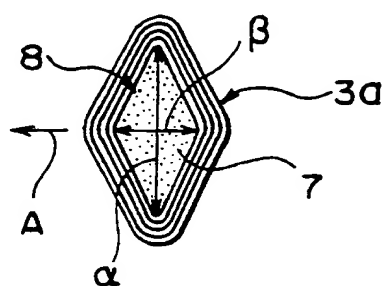


FIG. 10

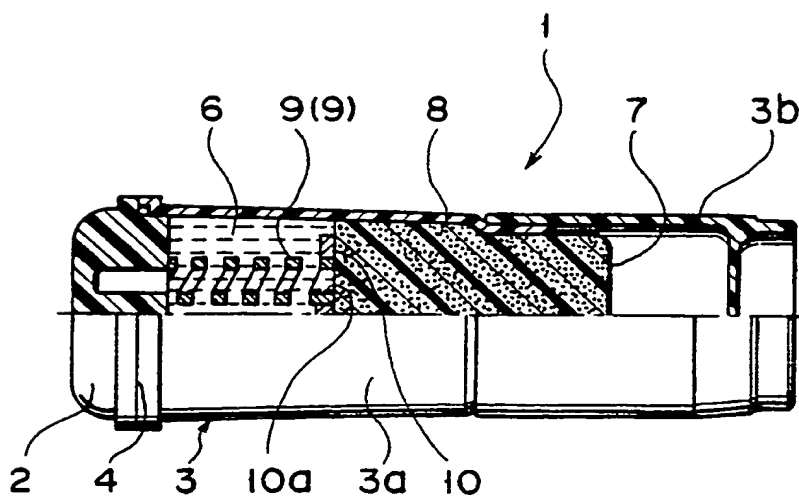


FIG. 11

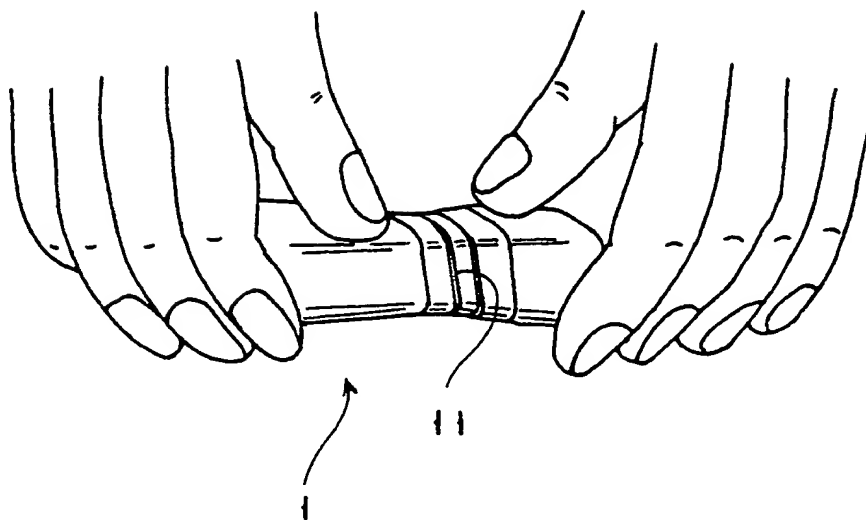


FIG. 12

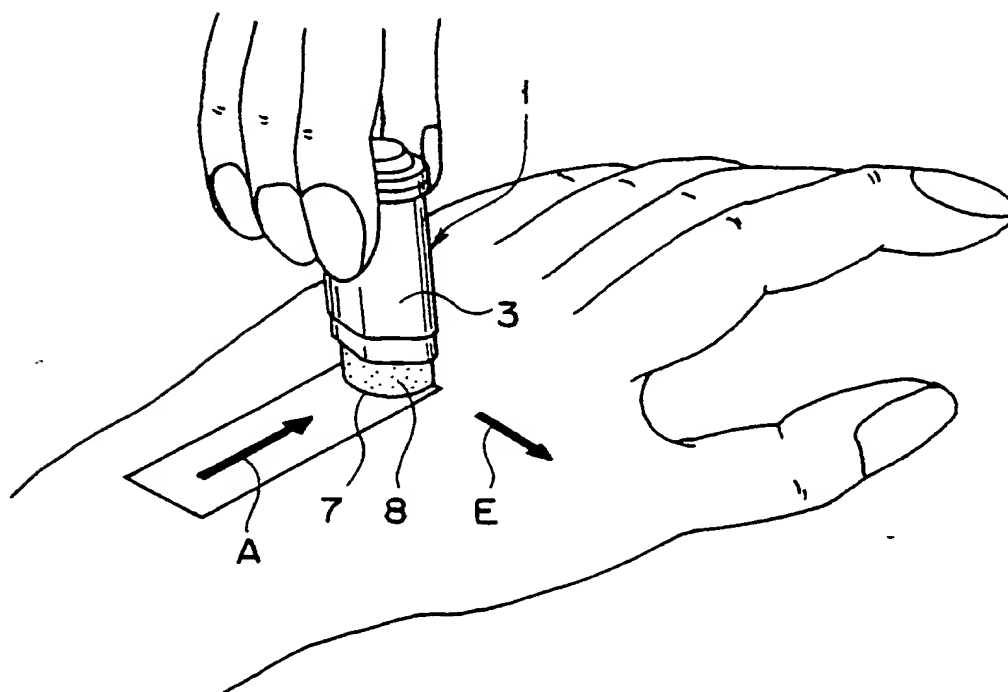


FIG. 13

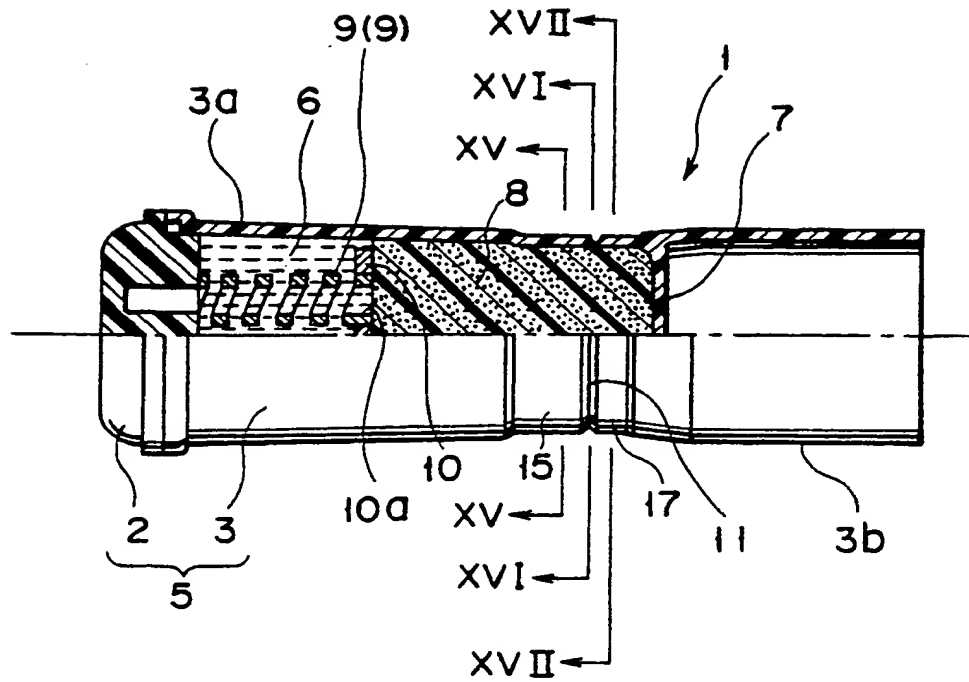


FIG. 14

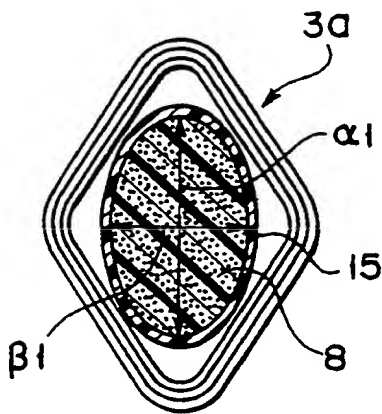


FIG. 15

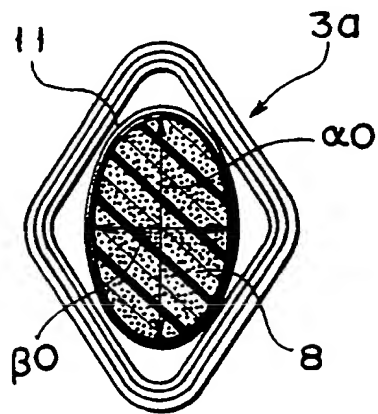


FIG. 16

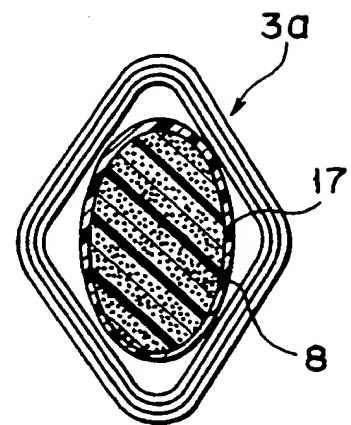


FIG. 17



European
Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 11 4702

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	WO-A-8 905 695 (TERUMO K.K.) * Figures 1A-1C * - - - -	1,2,4,6-8	A 61 M 35/00
A		5	
Y	US-A-4 415 288 (GORDON et al.) * Figure 1; column 4, lines 19-24 * - - - -	1,2,4,6-8	
A	WO-A-8 503 275 (LAIPPLY) * Figures 3,6B * - - - -	3,4	
A	US-A-4 282 986 (af EKENSTAM et al.) * Figures 20,23A; column 6, lines 22-24,53-55 * - - - -	5	
A	US-A-3 618 604 (R. NESS) * Figure 2; column 3, line 74 * - - - - -	4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5) A 61 M
Place of search The Hague		Date of completion of search 09 November 90	Examiner SEDY, R.
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document			

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☒ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.